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Nineteen of these interruptions were noted; one was caused by a small fly striking the snare, which the male darted at in a fierce manner, but failed to seize, as the fly broke loose before he reached it. Others were caused by the observer touching the foundation threads or other parts of the nest. Toward the close of his observations he accidentally broke the suspending lines nearest to him and so caused one side of the dome to fall in. This made only a momentary interruption. Many of these separations were, however, apparently without any extraneous cause. Twice the male ran to one side of the dome, made a web attachment to a bit of leaf hanging in the snare, drew out a thread about two and a half inches long, which he overlaid a couple of times, and then made the following motion: First, the body was placed erect, *i. e.*, back upward, and was moved back and forth along the line, rubbing the points or "nippers" of the palps at the same time; then the spider swung over until the body made an angle of about  $45^\circ$  with the line, and while holding on thus the palps were rubbed back and forth alternately along the line as before. The process was repeated during another of the intermissions, as described above. It was conjectured that the purpose of this movement might be the distribution of the seminal fluid into the palpal bulbs. This is taken up by the sacs, by the inflation and contraction of whose membranous coats it is forced into the spermathecae of the female.

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MAY 13.

WM. S. VAUX, Vice-President, in the chair.

Thirty-three persons present.

*The Lateral Sensory Apparatus of Fishes.*—Dr. FRANCIS DERCUM called the attention of the Academy to the so-called mucous canals, or system of the lateral line in fishes. Up to the year 1850 these structures had been regarded as glandular, that is, as secreting mucus for the purpose of lubricating the general surface of the body. However, the following facts at once strike us as being directly contradictory to this view. In the first place, their size would render them wholly insufficient; secondly, these canals are in most fishes practically closed; and in some fishes actually closed along their entire course. Again, in mollusks in which the surface is equally well lubricated with those of fishes we find no such structures.

After referring to the discoveries of Franz Leydig in 1850, and afterwards to the observations of F. E. Schulze on young teleost fishes, Dr. Dercum offered the following evidence in confirmation of the view that these structures are sensory. Like Leydig he described as occurring at regular intervals in the canals of the head and lateral line certain discoidal bodies, termed by Leydig

nerve-buttons, and in which terminates a nerve fibre. He corroborated Leydig's statements regarding the existence of a little mass of viscid mucous or jelly-like matter resting on each disk, and also regarding the positions of the disks, *i. e.*, as generally occurring under small bridges of bone in the canals of the head, and as occurring in every scale of the lateral line. However, the specimens exhibited by him showed a result entirely different from that of Leydig as regards the distribution of the nerves. Leydig pictures the disk as composed of two distinct areas, a dark or less translucent central portion, and a lighter peripheral portion. This appearance is, indeed, simulated in the fresh preparation, as the disk is somewhat transparent, and allows the insertion of the nerve fibre to be seen directly through it. No such appearance, however, is presented in specimens treated by osmic acid. A dense, arborescent plexus of nerve-fibres comes into view, and the distinction into two areas entirely disappears.

The size of the entering nerve as compared with the size of the disk is relatively very great, so that when the dense plexus of nerves makes its appearance it strikes one as though the bulk of the disk were nerve matter. Indeed, besides a large number of capillaries it contains only a small amount of connective tissue.

Owing to the want of the proper material, Dr. Dercum had not been able to confirm the observations of F. E. Schulze on young fishes. However, transverse sections of the disks macerated in osmic acid and teased, yielded essentially the same results as regards the structure of the epithelium. This appears to consist of two kinds of cells, one long and cylindroid, the other small and globose or pyriform, and having long outrunners penetrating the subjacent connective tissue. These outrunners are probably continuous with nerve-fibres, which they resemble. The drawings representing the connections of the nerves with the cells, given by F. E. Schulze for the "nerve-hills" of young fishes, are, therefore, very probably correct, but the material at hand did not permit an absolute decision of the point. The hairs of these perceptive cells were readily distinguished, but were generally broken and mutilated, owing doubtless to the reagents and teasing.

As is well known, the canals of the head are generally provided with bony supports, which form grooves, and which are at intervals generally bridged over by bone. Thus certain membranous inter-spaces of greater or less size are produced. In some fishes, as *Centropomus undecimalis*, the bony bridges are more or less wanting, so that a comparatively large expanse of membrane is formed stretched between the two walls of the canal. These membranes are, of course, composed of two elements. They consist, first, of the delicate connective tissue and flattened epithelium belonging to the canal, and, secondly, of the dense layer of connective tissue and epithelium belonging to the skin. The two layers can be readily separated by a careful dissection. Each

membrane, were it stretched tightly, would form functionally a drum-head. It is, however, quite loose, and will fluctuate readily on pressure.

The function attributed to this apparatus by F. E. Schulze, that these structures appreciate mass movements of the water, and also waves having longer periods than those appreciated by the ear, is no doubt the correct one. However, the canals cannot act in the manner suggested by Schulze, *i. e.*, by allowing the water to flow freely through them, as such a free communication with the surrounding medium as is implied, is not present. As already stated, in some fishes the canals are completely closed along their entire course, and when openings are present, they are probably for the purpose of maintaining an equilibrium of pressure within and without the apparatus.

The true detailed action of these organs is probably as follows: Let us suppose any disturbing cause to set up a wave of long period in the water. It impinges, first, on the membranous inter-spaces or drum-heads before spoken of, and with the greatest intensity, of course, on those which are most nearly placed at right angles to its direction. The wave is thus communicated to the liquid in the canals, which transmits it to the adjacent masses of jelly-like mucus covering the disks. The quivering of these little masses probably excites and intensifies vibrations of the hairs of the perceptive cells. The fish probably judges of the direction of the disturbing cause by the portion of the apparatus most intensely excited. The membranous spaces or drum-heads, when the apparatus is well developed, are so arranged as to favor the perception of vibrations from almost all directions.

Dr. Dercum suggested that it would be well, in view of the confusion existing in the present names of the dermal structures of fishes, to call these organs definitely the *lateral sensory apparatus* of fishes. This would, of course, not include the sensory ampullæ of the sharks and rays, nor the Savian vesicles, which have already distinctive names. In view of the structural resemblance of the sensory disks to the maculæ acusticæ, he proposed to call them the *maculæ laterales*, giving a specific signification to the word macula.

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MAY 20.

The President, Dr. RUSCHENBERGER, in the chair.

Thirty persons present.

*Note on Mound-making Ants.*—Mr. McCook said that he had had an opportunity to spend a day (June 12) on the Allegheny Mountains, above Birmingham, Huntingdon Co., Pa., observing the habits of *Formica exsectoides*, our mountain mound-builder. While standing near a yellow pine tree whose roots ran into a